

ABC Panel Discussion Notes

Question 1: How do you figure “user cost” and how do you present it to management that its part of the project cost thus avoiding the “low bid” award?

University of Utah currently has developed two models which estimate the cost to the user. ADOT also has a model available. These models assign a price the public pays for the delays experienced during construction. If the estimated user costs cover the additional cost of using ABC methods, then they will be considered. The ultimate goal is to develop a nationalized user cost model that AASHTO will accept.

To avoid low bid award, Mary Lou Ralls suggested an A+B bidding type approach, where “B” is a critical duration factor, or the number of days the contractor impacts the public during construction. This would allow UDOT to consider proposals which have less impact to the public, and not just the one with the lowest price.

Question 2: What are the main differences in the design process when SPMT are used?
- Richard Hansen; Washington Group International

According to Mike Arens, the design is much the same as for a traditional bridge with a few exceptions. One challenge is to figure out how to build the new substructure within the constraints of the existing bridge. Another is to design the superstructure with the final conditions in mind so it will have the correct geometry when moved from the staging area to the final location. Accurate survey data is a must, and with the new improvements in the survey industry more accurate data is readily available. Mike, along with Boyd Wheeler, discussed the need to check the bridge for all the stresses encountered during the movement of the superstructure as well as the final loading conditions. Mary Lou Ralls mentioned the importance in setting field tolerances in such a way that the structure is still constructible but its integrity is not undermined.

- Can SPMT be used with concrete girders?
Both steel and prestressed concrete girders have been used, each having their own pros and cons. Steel girders weigh less but are very flexible, whereas, concrete girders are heavier but more rigid. Concrete girders were considered for the 4500 S over I-215 Bridge but the idea was abandoned to eliminate the need for a center pier.
- Does Mammoet have engineers to provide technical assistance during the design process?
Mammoet has engineers to provide technical information for their equipment; however the designer still has the responsibility to work out the details of the movement of the bridge. The designer also needs to be familiar with how Mammoet moves the structure

in order to check all incurred stresses. For liability issues, a contract document outlining the duties of design team and moving company is important.

- Why was CMGC used on 4500 S over I-215 Bridge?
It allowed UDOT, the contractor and the design team to work together from the beginning. Since this was the first time UDOT attempted this type of project, this lowered the risk for all parties involved by identifying the problems early in the project.

Question 3: What is the availability of SPMT's in the region?

- Richard Hansen; Washington Group International

There are no SPMT companies located locally. However, companies, such as Mammoet, have the resources to mobilize anywhere in the country and even internationally. Currently, mobilization is the major cost item for SPMT. Coordination between the SPMT industry and contractors on projects may allow mobilization between projects within the state, therefore lowering costs. By approving a program of SPMT projects, it will show the industry that a market exists here, and hopefully companies will move in locally.

- Are there other companies who do SPMT besides Mammoet?
Yes, however Mammoet is the largest supplier. Getting word out to other companies about the SPMT projects available in Utah will lower costs by creating more competition between them.

Question 4: With the use of precast deck panels, what has been the experience with this type of construction with service life? The use of deicing salts may create a situation where the salt solution could penetrate through the panel joints. Also is there any evidence of reflective cracking through the concrete overlays?

- Bob Jacobs; Stanley Consultants

According to field observations, 15 to 20 years is the current service life. Efforts are being made to improve the life to 25 to 35 years through new standard details. Post tensioning the panels and overlays are being used to help increase service life.

A critical part of the service life of precast panels is in the connection details. Research is being conducted to provide better connection details between panels. The results are available in "NCHRP 12-65" report which is downloadable on the web. According to Mary Lou Ralls, the report presents two connection details which do not require an overlay or post-tensioning. Carmen Swanwick, HDR, is currently working on a project to provide standard panel connection details for UDOT.

Precast panels are less permeable to salt solutions than cast in place concrete since the panels are cured in a controlled environment. This causes less cracking and higher concrete strengths. Additives, like fly ash, can also be added to increase the density of the concrete, thus lowering its permeability. To help prevent penetration between panel joint, post-tensioning of the panels and overlays can be utilized. However, through field observations, the critical area for penetration seems to occur at the closure pour between the precast and the cast in place elements and not between the panel joints.

Reflective cracking has been observed in the field but are minor. The cracks are not “working” cracks; therefore they do not cause corrosion.

Question 5: How is the contractor selected for the CMGC method? Is it a competitive process?

- Stewart Gloyd; PBS&J

It is a competitive process. The contractor is selected based on two components: a price component and a best value component. The scoring is based on experience, approach, pricing and approach to pricing.

One of the benefits of CMGC is the contractors get involved early in the project. Errors are found earlier, scheduling is worked out, and risks identified, therefore lowering design costs. From a contractors view, the risks are redistributed back to UDOT, whereas in a design build project most of the risks are taken by the contractors.

Question 6: Has there been any project using CMGC where the contractor involved with design phase has not been the contractor to build the bridge?

- Stewart Gloyd; PBS&J

So far the contractor involved with the design phase has been the contractor to build the bridge. It is a possibility the selected contractor did not meet budget and the project has to be let to bid. However, this would indicate a failure in the CMGC process. An independent estimate for the engineers estimate keeps the CMGC process working and helps in selected the right contractor in the beginning.

Question 7: Discuss inspection and deck monitoring of structure during transport (SPMT).

- Will Reeves; Quality Plus

During the movement of the bridge, hairline cracks developed along the parapet which was expected. However, after the bridge was placed, the majority of the cracks closed. Overall, very few cracks developed in the deck and considerably less formed than in a traditional cast in place deck.

Question 8: Do construction specifications exist which state maximum distortions allowed on prefab superstructures?

- Will Reeves; Quality Plus

Currently, no standards specific to prefab superstructures exist. On the 4500S over I-215 Bridge, the designers met with UDOT and developed a design memo outlining the design limits. The designers also kept the limits to within AASHTO LRFD specifications.

Question 9: Discuss available real time monitoring techniques which can be used during superstructure transport.

- Will Reeves; Quality Plus

There are techniques available which monitor the stresses in the superstructure during transport, such as strain gages and accelerometers. Currently, UDOT does not have a standardized method of monitoring, but is considering creating one.

Question 10: Fiber reinforced plastic (FRP) structural elements. As design specifications are being developed to utilize this material, has UDOT investigated the pros/cons of implementing FRP in future bridge projects? (As is may relate to accelerated bridge construction.)

- Nash Wilson; HDR

FRP is lighter and behaves well under seismic loads. Challenges with using FRP are that it can only be used on lower traffic volume structures and there are currently no major manufactures. In Maryland, FRP was used on a bridge deck replacement due to limited room for a crane, since the panels were light enough to place without them. The panels also increase the overall capacity of the deck. FRP has limited uses and needs to be considered on case by case situations.

Question 11: I understand you are planning on using the ABC on 16 Bridges on I-80. Could you tell us what bridges will you be starting on and when?

- Cali Bastow; UDOT Consultant Services

Currently, the precast yard at 1300 E is being constructed. Work on the temporary abutments will be starting next week. In 2008, half of the bridges will be replaced and the other half in 2009.

- Does UDOT have a goal to force a specific ABC method?
UDOT's goal is to implement ABC but not one specific ABC method. There are many ABC tools available and one should be chosen based on the projects specific situation. After the 4500 S project, the public has now seen the benefit of ABC and demands more. Therefore, the public and legislators may become the major source to force ABC.

- How does ABC improve quality?
In using precast concrete, there is more control in the curing environment eliminating shrinkage cracks. Higher quality of concrete, 4000 psi to 5000 psi, is used in order to help turn over the beds quicker. Tolerances, such as reinforcement cover, are tighter and easier to measure in the precast yard.
- Is an SPMT cast in place deck better than an on-site cast deck?
By casting the concrete off site eliminates the vibrations caused by traffic. Wind is reduced since the slab is cast closer to the ground. Less safety issues exist since the crew is not working near live traffic. All these factors create a better bridge deck.